**Virtual Lab: Plant Transpiration**

<http://glencoe.mheducation.com/sites/dl/free/0078757134/383946/BL_10.html>

**Objectives:** Describe the process of transpiration in vascular plants.

Investigate the affect of various environmental factors on the transpiration rate in plants.

**Background information**: What factors affect the transpiration rate in plants?

In vascular plants, water is absorbed through the roots and carried upward through the stem to the leaves. The force behind this upward movement is called capillary action, a force of attraction between molecules that causes liquids to move up narrow tubes, such as those inside a plant's stem.

Some of the water absorbed by a plant's roots is used for photosynthesis, but much is lost to the environment through a process called transpiration. During photosynthesis, tiny pores on the surface of the leaves, called stomata, open to permit the intake of carbon dioxide and the release of oxygen. Because the stomata must remain open for the exchange of gases, large amounts of water are lost to the environment through evaporation.

Water that evaporates from the leaves is continually replaced with water that is absorbed through the roots. Therefore a plant's rate of transpiration can be measured by observing the amount of water taken up through a plant's roots over a period of time. The transpiration rate can be approximated by measuring the amount of water taken up in a short time through the plant's stem.

In a laboratory, a plant's transpiration rate can be measured using a potometer. A potometer can be assembled from standard laboratory materials including: a ring stand, clamps, a 10mL pipette, a 100mL burette, a T-tube, glass tubing, and rubber tubing.

To measure transpiration rate, a plant sprig is mounted on the potometer and the burette and pipette are filled with water. Over time the plant will transpire and absorb water through its stem. The potometer is constructed in such a way that the plant's water source is the pipette, therefore the amount of water transpired over time can be determined by reading the water level in the pipette after time has passed. The water supply in the pipette can be replenished from the water supply in the burette by releasing the pinch clamp.

**Experiment:**

Read the directions on the left side of the lab to run the experiment.

**Observations:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Plant | Normal | With Fan | With Heater | With Light |
| Arrowhead |  |  |  |  |
| Coleus |  |  |  |  |
| Dieffenbachia |  |  |  |  |
| English Ivy |  |  |  |  |
| Rubber Plant |  |  |  |  |
| Weeping Fig |  |  |  |  |
| Zebra plant |  |  |  |  |

**Independent Variables:**

**Dependent variable:**

**Journal**:

1. Describe the process of transpiration in vascular plants.
2. Describe any experimental constants used in the investigation.
3. What environmental factors that you tested increased the rate of transpiration?

Was the rate of transpiration increased for all plants tested?

1. Did any of the environmental factors (heat, light, or wind) increase the transpiration rate more than the others?
2. Which species of plant that you tested had the highest transpiration rates?

Why do you think different species of plants transpire at different rates?

1. Suppose you coated the leaves of a plant with petroleum jelly. How would the plant’s rate of transpiration be affected?
2. Of what value to a plant is the ability to lose water through transpiration?